ABB MEASUREMENT & ANALYTICS

Measurement made easy

In space, on the ocean floor and everywhere in between

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Comprehensive measurement solutions
Serving your industry

ABB‘s measurement and analytical products provide world-class measurement solutions for any industry, utility or municipality. Latest innovations deliver technological solutions to make it easier for you to run your plant. ABB’s measurement and analytical products are based on common technology, providing a common look and feel and method of operation. This results in products that are easy to configure, easy to integrate, and easy to maintain.

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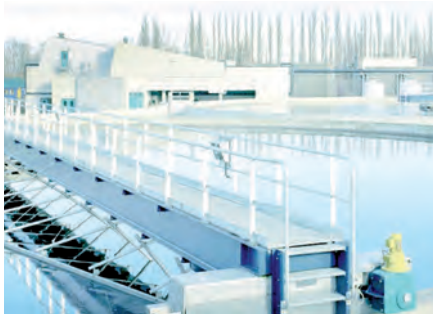

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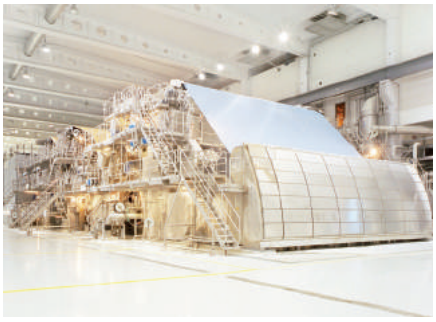

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Analytical measurement
Maximize quality and productivity

01 Analytical instruments for water and waste, steam and ultrapure water

02 Analytical shelter with gas analyzers and gas chromatograph

As the world's leading supplier of liquid and gas analytical technologies, ABB offers an unmatched line of analytical instruments. These solutions are designed to maximize your product quality and minimize your plant maintenance. ABB is your single source supplier of analytical measurement products.

ABB's analytical measurements portfolio:

- Continuous gas analyzers
- Gas chromatography
- Spectrometers (FT-IR and FT-NIR) and Photometers– Water analyzers
- Dissolved organics and nitrate
- pH and redox
- Conductivity and resistivity
- Colormetric analyzers
- Chlorine and ozone analyzers
- Turbidity
- Dissolved oxygen
- Ion selective
- Analytical system integration
- Cavity Enhanced Laser Analyzers
- Reid Vapor Pressure analyzers

"ABB's analyzer precisely matched the level of coagulant dosing enabling us to reduce chemical usage by over USD 304,650 per year."

Andrew Wetherill,
Operational Scientist, Yorkshire Water

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Measurement made easy

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01 ABB analytical measurement – your partner in advanced analytical solutions

ABB's analytical solutions provide real-time analysis in a variety of industries and applications. These liquid and gas analytical products enable cost-effective measurements in order to monitor product quality, meet process requirements, control chemical usage and conform to local and global environmental regulations.

Maximize your product quality
Whether you are producing ethylene or drinking water, ABB has the right analyzer technology to help you maximize your product quality. High product quality impacts your ability to set price, satisfy your customers and reduce the costs associated with poor quality. Contact ABB for help in maximizing your product quality using analyzers.

Meet process requirements
Enable the efficient operation of your process by analyzing key areas and ensuring they are operating in the optimum way.

Chemical imbalances, pH issues and incorrect dosages can lead to degraded or even dangerous process conditions. ABB has the expertise to ensure your process is operating at optimal efficiency.

Control chemical usage
Incorrect chemical dosage costs you money, could be dangerous and can negatively impact the environment. ABB offers a full line of analyzers to monitor applications and help optimize chemical usage. Contact ABB for solutions to help conserve natural and financial resources.

Regulatory compliance
ABB is your partner in meeting the ever-increasing regulatory requirements for your industry. We offer a full line of analyzers to help monitor emissions, optimize combustion and analyze discharges into the environment. Avoid regulatory fines and penalties with ABB's analyzer solutions.

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ABB MEASUREMENT & ANALYTICS

2600T Pressure transmitters

Pressure measurement made easy

266 pressure transmitters
Performance with intelligence

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01 266DSH
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02 266HSH wireless

266 delivers previously unattainable operational benefits
From the design to the software functionality, the 266 series represents the latest evolutionary step in the wide ABB product portfolio. Users can easily find the right application solution for their measurement needs and select among different levels of accuracy.
The 266 is available with an high accuracy up to 0.025% of the top performance models. This allows the user to control their processes with an excellent precision for pressure, level and flow measurements. Accuracy is no longer a constraint.
Notable is also the choice of measuring ranges allowing to measure pressures from 0.05 kPa (0.2 inH2O) up 105 MPa (15000 psi). 266 is one of the few low range differential pressure transmitters offering an outstanding suitability draft range for measurements.
Pressure transmitter models are suitable for measurements up to 1050 bar (15000 psi), using Inconel 718 NACE compliant material for wetted parts.
One further highlight available with the 266 differential pressure transmitter is the version for high static pressure applications. This allows to measure differential pressure with a high accuracy in applications with maximum working pressure (MWP) up to 60 MPa (8700 psi). Naturally this version also includes Ex certifications, if required.

Go for wireless with 266 Pressure transmitters
ABB WirelessHART 266 pressure transmitter enables the easy addition of pressure measurement points throughout your operation. You can now monitor hard-to-reach locations and keep your employees out of dangerous and hazardous areas.
266 WirelessHART has a battery life up to 10 years at 32 sec. update rate, delivering a very cost-effective and reliable solution to monitor your process assets.
Installation times and overall implementation costs of process measurements are significantly reduced by eliminating complex wired infrastructures.

TTG Technology: no more barriers between users and instruments
ABB is the first instrumentation company able to offer on its HMI (Human Machine Interface) the Through-The-Glass technology (TTG). With this exclusive and innovative option, users can interact directly with the instrument without removing the windowed front cover, saving cost and time, especially in hazardous areas.
Using ABB's proven four button HMI with intuitive menu navigation and Easy Set Up menu, configuration times can be greatly reduced. Moreover, expensive handheld configurators are no longer necessary since all the essential parameters can be set via the HMI with simplicity.

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Simplicity and compactness
The key to the platform for pressure

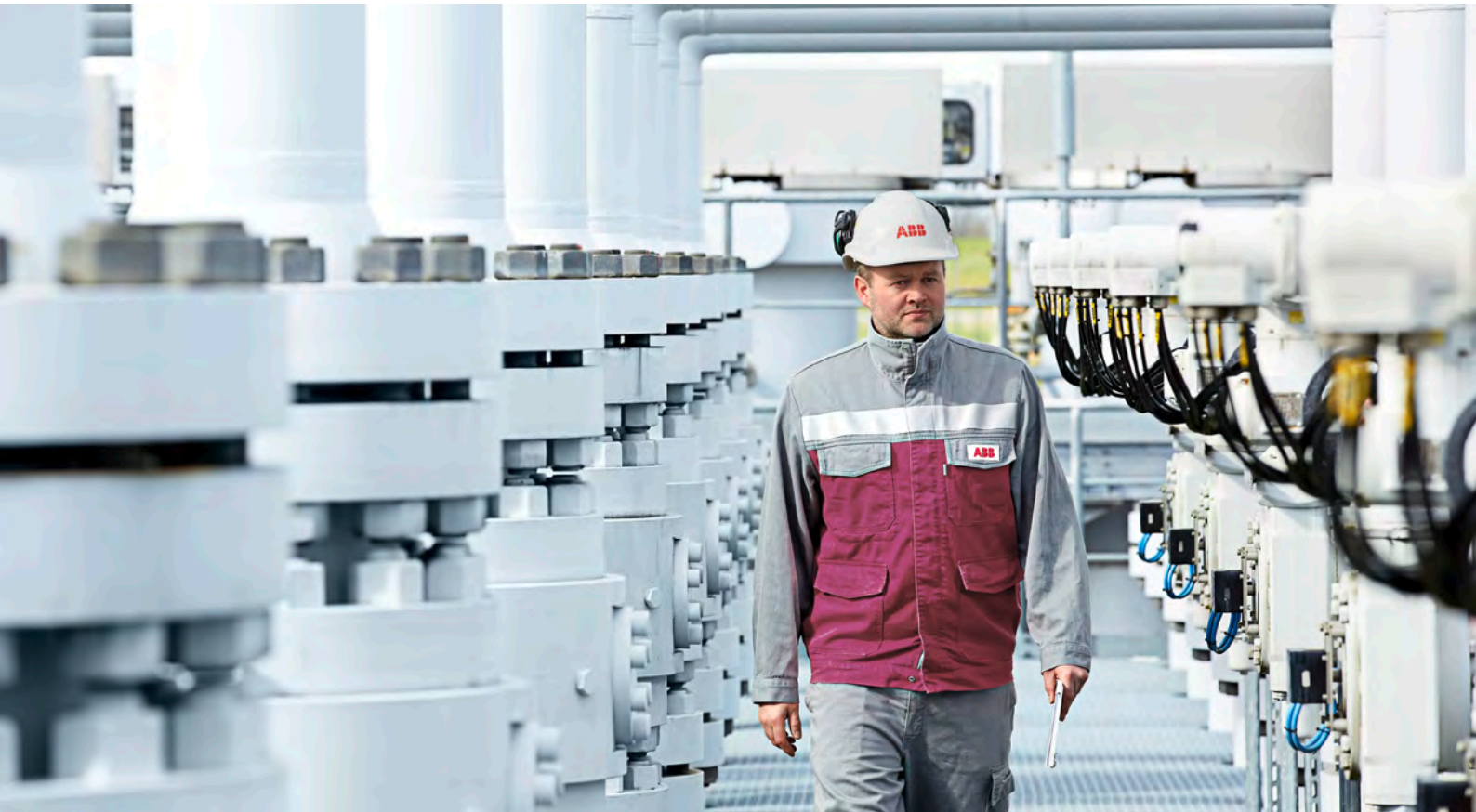
Easy to use... starting from the outside
The external non-intrusive zero and span push buttons allow users to rerange the transmitter safely in a few seconds.
An additional external write protection is also provided.

The 266 series never lets you down: plug-in communication board and terminal block
The new design enables in-field maintenance operations.
Both terminal block and communication boards can be replaced in few minutes without the need to reconfigure the transmitter.
Failures due to lightening, wrong earth wiring, etc. are no longer an issue: 266 is protecting your plant productivity smartly.

Most served industry segments
- Oil & gas
- Chemical
- Power
- Metals & minerals
- Water & wastewater

PILD: Plugged Impulse Line Diagnostic as standard
Process diagnostics will continuously protect your 266 HART / 4-20 mA, PROFIBUS PA and FOUNDATION Fieldbus pressure transmitters from the risk of impulse line clogging or freezing. Once a process anomaly is detected, the PILD function will generate a warning on the local LCD as well as via the communication protocol.

SIL2 and SIL3 TUV certified
The 266 series is certified by TUV NORD for use in safety instrumented systems as per the requirements of IEC61508.
The transmitters meet the requirements for SIL2 applications in a single transmitter configuration (1oo1) and for SIL3 applications in a redundant configuration (1oo2).



266 multivariable transmitters
Best performance on the market

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01 266CSH multivariable transimtter
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02 266GRT multivariable transmitter with remote diaphragm seal

Performance characteristics
Differential pressure measurement with high accuracy of 0.075 % or also top accuracy 0.04 %. An optional accuracy of 0.025% is available. Useable for applications with static pressures up to 41 MPa. It is very suitable for draft range applications (for example: area average meters) due to the 1 kPa sensor range.

Simple usability
The 266 multivariable transmitter can be delivered from factory fully configured according the customer specific application parameters. On site 'Easy Set-Up' possible with LCD, EDD or DTM. Only one instrument to install instead of 3, this means easy installation. Easy testing by simulation of the measured values.

High security
The multivariable model is covered by certification for intrinsically safe and/or flameproof applications, according to main international standards as ATEX , IECEx , FM, EAC and also SIL 2/3 certified.

Cost performance ratio, increase safety
Compared to single sensors the 266 multivariable transmitter save 30-40% of cost. One instrument instead of 3 means reduced connections and I/O modules, less valves and less replacement parts required and reduced maintenance. Furthermore less process penetrations means less potential leaking points and higher safety allowing push down ownership cost.

Reliable solution for high pressure direct mass measurement
The unique combination of several sensor systems in a single device permits simultaneous measurement of differential pressure, absolute pressure and process temperature, via an external sensor. Used for DP flow measurement it calculates the mass flow of gas, steam and liquid with dynamic compensation. The measurement accuracy improves by 1 to 2%. Due to the available draft range, this transmitter is tailored for use with the cheap and easy to install averaging Pitot tubes. In level applications the multivariable transmitter calculates fluid density depending on temperature and pressure for dramatically increase of measurement accuracy even when using diaphragm seals.

Boost the availability
And in the seldom case of fault the smart self-configuration function of the changeable electronic enables field repairs to be carried out so that the instrument is back in operation within minutes. This short Mean Time To Repair (MTTR) combined with the high MTBF is the base for highest availability. The integrated "Plugged Impulse Line Detection" (PILD) function is another nice tool for an enhanced availability indicating a potential problem before it becomes a problem.

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266 multivariable transmitters
Mass flow and level measurement

Mass flow measurement
Mass flow of gas, steam, liquid and standard volume flow of gas are calculated in accordance with AGA3, ISO 5167 and standardized correction calculations GERG88, AGA8.
Highest accuracy is achieved through:
- Dynamic flow orrection with continuous calculation of Reynold's number and flow coefficient
- Correction of material-dependent thermal size changes
- Linearization of the primaries

Shorten maintenance time
In case of changes in the process the "Easy Setup" feature, carried out with local indicator, handheld terminal or Device Type Manager (DTM) allows to adapt the instrument within shortest possible time.

Level measurement
Improves the hydrostatic level measurement with or without diaphragm seals due to density correction for level measurement in open tanks, closed tanks, boiler drum measurement

Features
- Mass flow measurement with dynamic compensation and level measurement with density compensation
- Calculation of energy flow for steam and water
- Binary output for flow impulse/frequency or status
- Integrated totalizer
- Plugged Impulse Line Detection (PILD)
- HART, FOUNDATION Fieldbus and Modbus
- EN/IEC61508 certification for SIL2 (1oo1) and SIL3 (1oo2)

Benefits
- One 266 multivariable replace 3 separate transmitters
- Reduced costs for installation and maintenance
- Reduction of potential leaking points leads to savings for the plant.
- Increased plant availability by changeable electronic with automatic configuration capability
- Easy Set Up function for reduced on-site installation engineering with TTG technology for configuration without opening the transmitter housing
- Implementation in ABB compact primary elements (Orimaster) allowing to supply a fully compensated flow solution

Target markets and applications
- Oil & gas: gas flow measurement and 3-phase measurements (OEM)
- Pulp & paper: steam flow measurement in the power plant or in dryer section of the paper machine
- Chemical Industry: process gas flow in refineries, petrochemical and chemical installations and liquid level in tanks
- Energy: combustion control and feed water control, flow measurements of combustion air, fuel, steam and feed water boiler drum level measurement
- Food & beverage: water and steam measurements in boiler houses and level measurement in tanks

261 pressure transmitters
The quality cost-effective solution

The 261 series is the result of our focus on essential features for pressure and level measurement

- Base accuracy ± 0.1 %
- Compact and extremly robust housing of AISI 316 L ss
- Maintenance free due to ABB's reliable well-proven sensor technology
- Easy operation and set up via the graphic display with intuitive menu navigation
- Wide choice of process connections to suit multiple installations in various industry segments e.g.:
  - Threaded connections for the power or pulp/ paper industries
  - Flanged connections for the chemical industry
  - Hygienic connections for the pharmaceutical or food & beverage industries
  - Designed to meet both CIP and SIP applications
  - Output signal 4...20 mA with HART digital communication
  - Conforms to SIL2 according to IEC 61508 / IEC 61511

Most served industry segments

- Water & wastewater
- Food, beverage and pharmaceutical
- Pulp & paper

2600T All-Welded diaphragm seals
Performance and reliability over time

Flanged models

The ABB diaphragm seal portfolio includes rotating and fixed-flange models specifically designed to connect to flanged pipe fittings according to ASME, EN, ISO and JIS. Flushing rings available are available as option.

Ring-joint construction

This type of diaphragm seal, flanged according to ASME standard, has been designed for high pressure / high temperature conditions.

Wafer / Pancake

Designed to connect to ASME and EN standard flanges the wafer diaphragm seal offers stable performance for a large number of applications. Flushing rings complete the offering. Wafer seals represent a cost-effective and reliable application solution.

Off-line seal

Available with threaded or ASME/ EN flanged process connection, the Off-line model matches small process connections. Recommended for clean process fluid measurements.

Sanitary models

Diaphragm seals developed according to the stringent 3-A requirements. Available with different process fittings (Triclamp, Cherry Burrel, Union Nut and Sanitary), this range demonstrates ABB's commitment to satisfy users needs by engineering solutions for the most demanding processes.

Union connection

A screw thread process connection that provides a flush diaphragm for gauge pressure applications. Originally designed by Taylor Instrument this connection is combined with the 'All-Welded' technology to provide a high integrity solution for arduous applications.

Chemical Tee

Available only from ABB and designed for the chemical and oil & gas industries, the Chemical Tee remote seal is designed to connect to a Wedge Flow Element or to any process fitting with the matching dimensions.

Button

Button seals are designed for accurate high pressure measurement with a small diaphragm size. This type of connection is especially suitable for plastic and resins production processes, at high pressure and high temperature conditions.

In-line

In line seals are suitable for measuring the pressure of fluids in pipes. The pressure measuring diaphragm forms the pipe wall making this type of seal suitable for measuring the pressure of flowing fluids, particularly those that are highly viscous or contain solids.

Pulp & paper

Designed especially for preventing process media from plugging the process connection, pulp & paper diaphragm seals can be manufactured with anti-abrasion coatings which extend the lifecycle and therefore reduce costs.

Urea service

This specialized remote seal is manufactured from materials which match the aggressively corrosive conditions when urea is present in the process. The urea grade wetted materials ensure stable performances even in high temperature / high vacuum conditions. Huey test available as option.

Socket & Saddle

These diaphragm seals have been developed to meet the requirements of users who require a directly welded process connection. They are suitable for highly viscous process fluids measurements.

MEASUREMENT & ANALYTICS

Level products

Measurement made easy

Laser level transmitters

Bulk solids and liquid non-contact laser level measurement

The ABB family of laser level measurement products provides solutions for measuring the level of any bulk solids or liquids for inventory or process control. Using narrow laser beams and advanced processing algorithms, they provide simple and reliable non-contact level measurement in industrial environments.

LLT100 Laser level transmitter

- Ideal for measuring the level of any solid or liquid without contact
- Range up to 330 ft. (100 m) for level of solids
- Range up to 100 ft. (30 m) for level of liquids
- < 0.3˚ beam divergence = no false echoes. Simple to setup and not affected by changesin environment.
- HART communication
- Explosion proof Class 1 / Division 1
  3A approval (Hygenic)

LLT100 Laser level transmitter

LM80 Laser level transmitter

- Ideal for plastics pellets, grain silos, crushers & rock silos, positioning applications without contact
- Range up to 330 ft. (100 m) for level of solids
- Range up to 500 ft. (150 m) for positioning
- No beam divergence = no false echoes. Simple to setup and not affected by changes in environment.
- Embedded laser pointer

LM80 Laser level transmitter

LM200 Laser level transmitter

- Ideal for long range positioning and long range level measurement
- Range up to 660 ft. (200 m) for level of solids
- Range up to 1310 ft. (400 m) for positioning
- Embedded laser pointer
- Same easy setup as LM80

LM200 Laser level transmitter

Ultrasonic level transmitters

Level by sound knowledge

ABB's KSONIK is the only ultrasonic level transmitter that uses dynamic GAP technology in order to locate the correct echo. The KSONIK utilizes the minimum amount of GAP (Gain, Amplitude and Power) at every possible distance within the measuring range. This simply means that we reduce the power to give you the most accurate reading with a beam angle of only 3 degrees, and then enough power to push through the most dusty environments.

LST300 - The most powerful ultrasonic level transmitter in a compact form

- 2-wire instrument with HART digital communication
- Up to 10 m measurement range
- Wide temperature range of -40 to 85 ˚C
- Accuracy of ±2 mm or 0.2 % of full span (the larger one)
- Beam angle as low as 5˚ with false echo filtering for narrow spaces
- Easy installation with graphic echo display, advanced diagnostic and easy setup menu
- Unique GAP technology ensures the best performance under any condition
- IP66/67/68 and NEMA 4X (can submerge to 2 m depth for 24 hours)
- ATEX, IEC & FM Intrinsic safe and non sparking approved

LST400 - Make all the control easy through remote transmitter

- 4-wire instrument with HART digital communication
- Up to 30m measurement range
- 5 configurable relays / 8A
- Configurable as open channel flow meter
- Preconfigured flow curves for most common channels
- 21 point linearizer for calibration of non-linear vessels
- Pump control and cycling
- Automatic variable gain & power for difficult applications
- Integrated analytical software
- FM general purpose approved
- IP66/67/68 for sensor and IP65 for transmitter

LST300 Ultrasonic level transmitter

LST400 Ultrasonic level transmitter

Ultrasonic level transmitters

Level by sound knowledge

LST100 - Accurately track and measure the most expensive consumable on your site – chemicals

- Up to 10m measurement range
- 1 to 5 V output, which means low power consumption during all conditions
- Ultra-low power consumption equivalent to a 4 to 20 mA instrument functioning constantly at 4 mA
- Excellent for chemical tracking and remote monitor of stock levels
- Automatic variable gain & power for difficult applications
- Typically powered from a solar or battery power source
- FM Intrinsic safe and non sparking approved
- IP66/67/68 for whole unit

LST100 Ultrasonic level transmitter

Guided wave radar level transmitters
Radar level detection for liquids and solids

Stable readings in the most challenging environments. ABB'S ability to provide engineered solutions for tough applications allows an engineer to specify the best coupler, probe design and material for the application.

MT series level transmitters
were the first guided wave radar level transmitters in the world to be certified for operation in IEC 61508 SIL2 and SIL3 control loops. The guided wave radar's self-monitoring capability continually checks for any faults that could cause device failures or false indications. The device features a graphic display incorporated into an all digital electronics module. The interactive waveform display allows the user to calibrate the instrument without the need for a handheld communicator or Laptop. The easy menu structure and multiple language options allow quick commissioning throughout the world. The MT5000 series has coax, rod or flexible cable probes available in multiple material options. With no moving parts and low signal loss, the MT5000 can be used in harsh industrial applications where reliablilty is an absolute requirement.

ABB can supply specialized couplers, rods, cables and probe-end connections. These components can be supplied in stainless steel, Hastelloy C276, Hastelloy B, Titanium, Tantalum, Monel 400 or Inconel 625.

Guided wave radar level transmitters

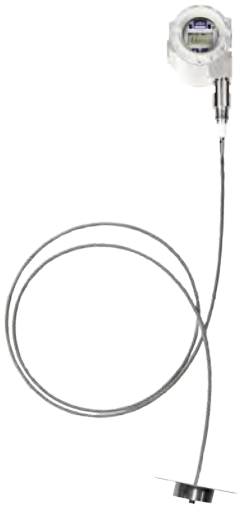
Radar level detection for liquids and solids

MT5000
- Reliable level measurement over varied process conditions
- Distance 2 to 217 ft/66 m
- Temperatures to 800º F (427º C)
- Pressures to 5000 PSI/344 bar
- Standardization reduces inventory and training requirements
- Modular electronics

MT5000 Guided wave radar transmitter for liquid and solid level

MT5100
- Provides both lower and upper level fluid indications
- Flooded or non-flooded chambers
- Transmission of interface and upper fluid signals with the use of the optional RI100 repeat indicator or via digital signal.
- Patented weak interface signal detection

MT5200
- Used in low dielectric liquid and bulk solids applications
- Unaffected by dust
- No moving parts
- Unaffected by feed flow
- Can measure levels with dielectric constants as low as 1.3



MT5200 Guided wave radar transmitter for bulk solids and low dielectric fluids

MT5100 Guided wave radar transmitter for level and interface

RI100
- Used when second 4-20 mA (analog) output is required
- LCD display
- Field replaceable module
- Simple calibration
- Dual compartment housing with separate field terminal compartment
- Built in RFI/EMI filter
- 2 in. stainless steel pipe stand mounting bracket
- Glass viewing window

RI100 Repeat Indicator for use with MT or AT series transmitters

Magnetostrictive level transmitters
Direct insertion transmitters

The K-TEK Level product line provides the only magnetostrictive level transmitters in the world to be certified for use in IEC 61508 SIL2 and SIL3 rated control loops.

LMT100

- Certified for use in SIL 2/3 applications per IEC61508
- High accuracy: .01% of full scale or +/-1.27 mm (+/- 0.05 in.) mm, whichever is greater
- Superior piezo ceramic sensor (Patent # 5,473,245)
- Local indication with LCD display
- Factory calibrated to customer's specification
- Never requires recalibration: set it & forget it
- Dual compartment housing with separate field terminal compartment
- Loop powered
- Up to 30 ft./9 m rigid probe length
- Total and/or interface level measurement
- Field replaceable/upgradable electronics module
- Optional surge protection
- Built in RFI/EMI filter
- 4-20 mA HART and FOUNDATION Fieldbus
- Safely remove sensor without exposure to process.
- Several non-wetted sensor well designs
- Flexible Sensor with insertion well
- Available in Halar *FEP sensor inserted into 1 in. segmented 316/316L sensor well
- Available in braided stainless steel inserted into a 5/8 in. OD rigid probe to 15 ft./4.75 m
- Up to 75 ft./22 m probe length maximum

LMT100 Direct insertion magnetostrictive liquid level transmitter with removable flexible sensor

LMT100 Direct insertion magnetostrictive liquid level transmitter

RF capacitance level switches

Direct-contact point level measurement for liquid or solids applications

Capacitance level switches
feature one-step external calibration, immunity to material build-up, and a wide selection of probes for even the most challenging applications from low dielectric bulk solids to sticky slurries. Whether the application involves liquids, pellets, granules, powders, chips, or flakes, ABB's RF Capacitance level switches feature one of the largest selections of probe elements available. In addition, the RF design means there are no moving parts to break or wear out.

A75
- Bulk solids and liquid applications
- Low cost level solution
- Fully potted electronics
- Built-in static protection
- Vibration resistant
- DPDT relay
- Process temperatures up to 450ºF/232ºC
- NEMA 4 enclosure
- 5,10 or 15 second time delay

KCAP400
- Liquids or solids
- Integral and remote electronics available
- Easy set up via external magnet or pushbuttons
- Housing with glass viewing cover
- Wide variety of 2-element level sensing probes available 450º - (232º C) / 3000 psig (206.8 bar)
- Field selectable modes of operation:
  - Single set point (horizontal or vertical installations)
  - Dual set point (vertical insallations only)
  - Pump control (vertical installations only)
- Element sensitivity down to 1.5 pF
- Explosion-proof enclosure

KCAP300
- Bulk solids/powders and granular applications
- KSHIELD™ 3-element sensing probes and single setpoint electronics that provide immunity to build up
- Integral and remote electronics
- Easy set up via external magnet or push buttons
- Explosion-proof enclosure
- Element sensitivity down to 0.5 pF
- LED alarm display

KCAP300 RF Capacitance switch with KSHIELD™ sensing probes and single setpoint electronics

RF capacitance level switches

Direct-contact point level measurement for liquid or solids applications

A75 RF level switch

KCAP400 RF Capacitance switch with selectable dual setpoint and pump control

Thermal dispersion level switches

Switches for flow, level or temperature applications

Thermal Dispersion Switch products can be used for flow, level or temperature detection. One switch can be field configured to detect one of these three process conditions. Thermal Dispersion level switches are extremely rugged and versatile and have high pressure and temperature capabilities. These switches can be calibrated for point level, air/foam, foam and solid/liquid interface or flow applications.

TX

- For liquids or small granular solids
- No moving parts
- 316L stainless steel all welded construction standard
- Explosion proof
- Pressure to 10,000 psi
  Temperatures to 500°F

Vibrating Fork Level switches utilize a piezoelectric-driven tuning fork and smart microprocessor based electronics to keep the sensor in a resonant state and will detect when immersed in a liquid (RS85).

RS85

- Continuous self-test diagnostic
- Variety of process connections
- DPDT dry contact relays
- Hazardous location approvals
- Explosion-proof enclosure

TX thermal dispersion switch

RS85 vibrating fork liquid level switch

Buoyancy level switches

Point level switches offering high pressure capability that are reliable and repeatable

A complete line of buoyancy
point level switches for most chemical, petroleum or general process applications. This family of products includes a variety of horizontal floats, vertical floats, and displacer switches. ABB's simple and reliable design offers great flexibility with custom insertion lengths, temperature ratings to 1000º F/538º C. Pressure ratings to 5000 psig/345 bar, and a wide selection of alloys. The ABB buoyancy switches are the highest quality and cost efficient solution to industrial liquid point level sensing.

MS50

- Up to six SPDT switches per unit (NO & NC contacts)
- Interface & total level capability
- Suitable for high temperature applications
- 316/316L stainless steel wetted parts standard
- Field adjustable and replaceable switches
- 316/316L standard, exotic alloys & thermoplastic available
- Internal Terminal block(s) connection

MS50 Buoyancy level switch

Magnetic level gauges

KM26 Magnetic Level Gauges are manufactured to suit your specific process requirements.

KM26 Magnetic Level Gauges
ABB's KM26 Magnetic Level Gauge provides custom engineered solutions to liquid level applications in industries such as: oil and gas, refinery, chemical, petrochemical, power generation and many more. The KM26 Magnetic Level Gauge has proven itself, for over 35 years, to be a safe, reliable and maintenence free solution for total and/or interface level measurement.

ABB offers the standard KM26 Magnetic Level Gauge with a chamber of virtually any non-magnetic material, extruded process connections, custom engineered floats and all accessories with 316 stainless steel construction. ABB also offers a dual chamber redundant level system, which has a proven record of improving feedwater heater efficiency and reliablility in power plants around the world.

- Highly visible level indication with no process fluid in contact with the glass
- All construction in-house by code certified welders
- Float designed and weighted for maximum accuracy
- Transmitter and switch options which can be installed, adjusted and maintained with no process interruption
- Safe for corrosive, flammable, toxic, high-temperature and high-pressure applications
- Rugged design - low or no maintenance
- ATEX Constructional Safety, IP68 and PED certifications; EAC TRCU approvals

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Table 01

Process Capabilities	
Pressure	Full Vacuum to 5000 PSI (351 kg/cm2)
Temperature	-320 to 1000 F/-196 to 538 C
Specific Gravity	0.25 specific gravity
Viscosity	All liquid viscosities
Interface	Interfaces as low as .03ΔSG

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KM26
Magnetic Level Gauge

The MagWave® Dual Chamber Magnetic Level Gauge
combines a highly visible magnetic level indicator with the precise level measurement of a guided wave radar transmitter. Redundant level control can be achieved by adding an additional magnetostrictive transmitter or switch to the float chamber.

The MagWave® is a level measurement system which combines a highly visible magnetic level indication with an output from a Guided Wave Radar Transmitter. The Magwave features two separate close-coupled chambers for the level indicator float and the Guided Wave Radar antenna. Using single probe radar transmitters in the standard 1-1/2 inch chamber provides the measurement capabilities of coaxial style probes without the potential for fouling due to buildup. A separate float chamber allows the float to travel unobstructed throughout the range of measurement. Redundant level control can be achieved by adding an LMT Series magnetostrictive transmitter or switches to the float chamber.

- Redundant level measurement
  - Guided Wave Radar
  - Magnetostrictive Transmitter
- Low cost of ownership
- Safe and simple installation
- 5 year warranty
- High visibility indicator
- Optional vent, drain and isolation valves
- Insulation for high and low temperature applications

MagWave® Dual Chamber Magnetic Level Gauge

Magnetostrictive level transmitters
Gauge mounted transmitters

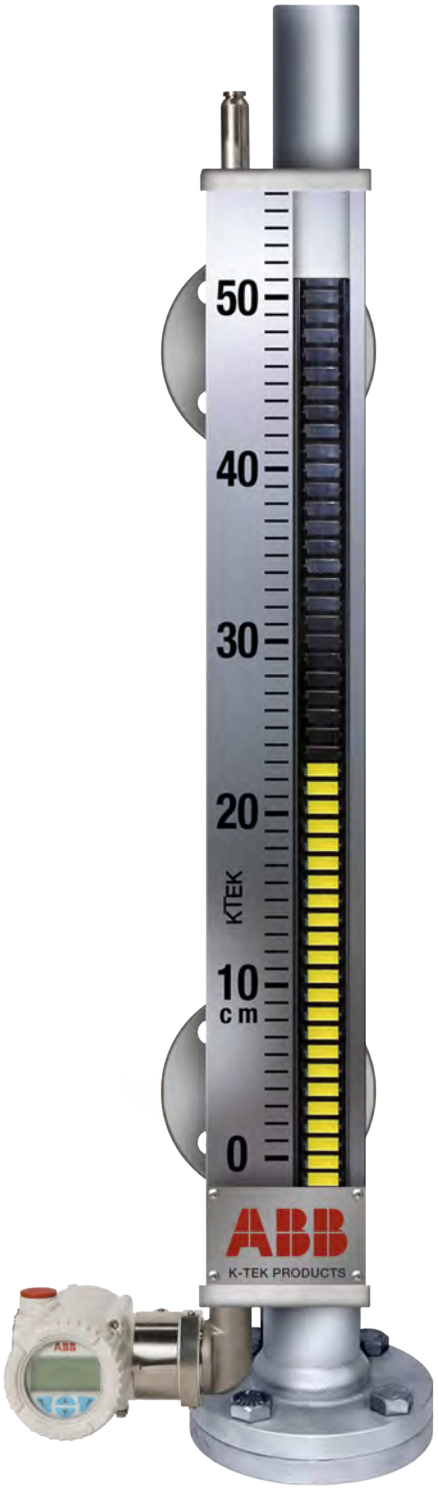
ABB provides the only magnetostrictive level transmitters in the world to be certified for use in IEC 61508 SIL2 and SIL3 rated control loops.

With over 200,000 magnetostrictive transmitter installations worldwide, the LMT Series Magnetostrictive Level Transmitter continues to provide the highest accuracy and repeatability for liquid level applications in the oil and gas, power generation, chemical, food and beverage industries and many more. These transmitters are used extensively around the world to provide continuous level indication, and transmission of an analog and/or digital signal for monitoring or control. The Magnetostrictive Level Transmitter versatility allows direct in-tank installation or externally mounted to a magnetic level gauge. 4-20 mA HART and FOUNDATION Fieldbus protocol options make the magnetostrictive level transmitters compatible with most control systems.

Magnetostrictive level transmitters
Gauge mounted transmitters

LMT200
Our floats are individually engineered for each application with the following:

- Certified for use in SIL 2/3 applications per IEC61508
- High accuracy: .01% of full scale or +/-1.27 mm (+/- 0.05 in.), whichever is greater
- Superior piezo ceramic sensor (Patent # 5,473,245)
- Local indication with LCD display
- Factory calibrated to customer's specification
- Never requires recalibration: set it & forget it
- Dual compartment housing with separate field terminal compartment
- Loop powered
- 50 ft./15 m rigid probe length maximum
- Total and/or interface level measurement
- Field replaceable/upgradable electronics module
- Optional surge protection
- Built in RFI/EMI filter
- 4-20 mA HART and FOUNDATION Fieldbus



LMT200
Non-invasive magnetostrictive level transmitter

ABB MEASUREMENT & ANALYTICS

Flow measurement made easy

A solution for every application

Flowmeters for liquids, gases and steam

A quick application guide

Application, product features	Electro-magnetic	Vortex/Swirl	Thermal mass	Coriolis mass	Variable area	Differential pressure	Flow computers
Liquids							
Conductive	●	●		●	●	●	
Non-conductive		●		●	●	●	
Solids content	●			●	●	●	
Pulsating	●			●	●		
Viscosity > 10 cSt	●	●		●		●	
Liquid calculations				●			●
Custody liquid measurement	●			●			●
Gas/oil well optimization							●
Gases							
Dry/clean		●	●	●	●	●	
Moist		●	●	●	●	●	
Corrosive				●		●	
Contaminated		●	●	●	●	●	
Gas calculations		●					●
Custody gas measurement				●			●
Steam*		●		●	●	●	●
Fluid temperature	-40 to 180 °C -40 to 356 °F	-55 to 400 °C -67 to 752 °F	-25 to 300 °C -13 to 572 °F	-50 to 205 °C -58 to 401 °F	-20 to 400 °C -4 to 752 °F	-50 to 500 °C -58 to 932 °F	
Ambient temperature	-40 to 60 °C -40 to 140 °F	-40 to 85 °C -40 to 185 °F	-25 to 70 °C -13 to 158 °F	-40 to 70 °C -40 to 158 °F	-25 to 60 °C -13 to 140 °F	-40 to 85 °C -40 to 185 °F	-40 to 60 °C -40 to 140 °F
Accuracy	0.2% of rate	0.5% of rate	1% of rate	0.1% of rate 1 g/l	1.6 per VDI/VDE 3513	0.7% of max.	0.075% of DP/SP span Flow-X: 0.002%
Partially filled pipelines	●						
Nominal diameter	DN 1 to 2400 [1/25 to 96 in.]	DN 15 to 400 [1/2 to 16 in.]	DN 25 to 3000 [1 to 120 in.]	DN 1.5 to 150 [1/16 to 6 in.]	DN 15 to 100 [1/2 to 4 in.]	DN 15 to 8000 [1/2 to 320 in.]	
Typical up-/ downstream sections	3D/2D	15D/5D 3D/2D	15D/5D	0D/0D	0D/0D	10D/4D	
Standard pressure ratings	PN 10 to 250 CL 150 to 2500 JIS 7.5 to 20K	PN 10 to 64 CL 150 CL 300	PN 40 CL 150 CL 300	PN 16 to 100 CL 150 to 600 JIS 5 to 20K	PN 16 to 100 CL 150 to 600	PN 10 to 400 CL 150 to 2500	
Hygienic/sterile certifications	EHEDG 3A, FDA		CIP/SIP	EHEDG FDA			
Certified calibrations	●	●	●	●	●	●	●
Ex-approvals	ATEX, IEC FM, CSA NEPSI, GOST	ATEX, FM CSA NEPSI, GOST	ATEX, FM CSA GOST	IECEx, ATEX cFMus, NEPSI GOST	ATEX, FM CSA	ATEX, FM CSA	ATEX CSA IEC, UI, FM
Communication	FF, HART, PA	FF, HART PA	HART, DPV1	HART, PA FF Modbus	HART	FF, HART PA	Totalflow, Serial Modbus TCP/IP, HART

* e.g. saturated steam, superheated steam

Selection and sizing made easy
ABB provides an excellent tool for selection and sizing of flow meters – including quick and simple flow calculation and a unique feature to compare different flow technologies.

The Product Selection Assistant (PSA) | Flow
The tool is available online or offline, to give a freedom of choice for various user groups.

—

Find out more at
abb.com/flow-selector

Electromagnetic flow measurement
For the process industry

ProcessMaster: for efficient plant operation and constant product quality

The first choice for demanding process industry applications. ProcessMaster electromagnetic flowmeter is tough, reliable, and incredibly easy to work with. It helps save resources at every stageof the lifecycle.

The solution
It offers the industry's widest range of liners, electrodes and sizes to meet the needs of even the most demanding process applications. The powerful transmitter is easy to use and provides the output signal that meets your needs. With ProcessMaster you get a versatile, reasonably priced, most accurate flow meter tailored for your applications.

FSM4000: your robust flowmeter for conductive fluids in heavy duty applications

It masters your critical applications and conserves valuable resources with highly accurate measurement of process parameters in a wide range of industries.

The solution
FSM4000 provides a highly stable output signal in challenging applications such as slurries within the mining industry – even with large pieces of rock. Its measurement performance is unsurpassed in applications with – high content of solids (e.g. pulp stock in pulp and paper industry), – pulsating flows or – any other high signal noise application.

HygienicMaster: your first choice for demanding hygienic applications

It provides best levels of performance, flexibility and control in the most demanding hygienic applications, resulting in better product quality and highest reliability.

The solution

HygienicMaster is designed specifically for the food and beverage, pharmaceutical and biotechnology industries. Manufactured from FDA approved materials and certified in accordance with EHEDG and 3A, HygienicMaster sets a benchmark. The sensor is fully CIP/SIP cleanable. Variable process connections simplify installation and reduce inventory as well as replacement costs.

General specifications			
Product	**ProcessMaster**	**FSM4000**	**HygienicMaster**
Nominal diameter	DN 3 to DN 2000 (1/10 to 80 in.)	DN 3 to DN 000 (1/10 to 40 in.)	DN 1 to DN 100 (1/25 to 4 in.)
Nominal pressure	PN 10 to PN 100, Cl 150 to Cl 2500	PN 10 to PN 40, Cl 150 to Cl 300	PN 10 to PN 40, Cl 150 to Cl 300
Process connection	Flanges in accordance with DIN/EN, ASME, JIS and others		Weld stubs, threaded pipe connections, Tri-Clamps, wafer-type, flanges in accordance with DIN/EN, ASME, JIS
Lining	Hard rubber, soft rubber, PTFE, PFA, ETFE		PFA, vacuum stable
Protection class	IP 67 or IP 68	IP 67 or IP 68	IP 67 or IP 68
Fluid temperature	Up to 180 °C (356 °F)	Up to 180 °C (356 °F)	Up to 180 °C (356 °F)
Ex approvals	ATEX, IEC zone 1 and zone 2, FM, CSA Div 1 and Div 2, NEPSI zone 1 and zone 2, GOST	–	ATEX, IEC zone 1 and zone 2, FM, CSA Div 1 and Div 2, NEPSI zone 1 and zone 2, GOST
Certificates	–	–	3A, EHEDG, FDA approved materials
Inputs/outputs	Analog output (4 to 20 mA), pulse output, contact input/output		
Communication	HART protocol (standard), PROFIBUS PA, FOUNDATION Fieldbus		
Verification tool	ScanMaster software	–	ScanMaster software

Electromagnetic flow measurement
For the water industry

WaterMaster enables easy flow measurement for water industry applications

It sets the standard for water, wastewater, sewage and effluent flow measurement and management. WaterMaster helps to efficiently manage precious water resources by accurately measuring water volumes consumed from production processes.

The solution
The modular design concept offers flexibility and reliability while providing a long service life and exceptionally low maintenance costs. WaterMaster's self-monitoring and diagnostic functions increase the plant availability and reduce downtime. The flowmeter is accurate and easy to use, offering in-situ verification as well as advanced self-calibration.

AquaMaster: for billing, survey and leak detection in remote locations

Providing economic and reliable water measurement, it saves energy and cost, naturally. It is a direct result of ABB's worldwide experience in the water industry and targeted at resolving environmental and industry specific requirements.

The solution
The AquaMaster is designed specifically for clean water applications. Its versatile power management options, 5-year battery or energy efficient wind and solar power, allow it to be placed remotely in the field; it can be buried and flooded. It measures flow and pressure accurately, provides logged data and can communicate remotely. AquaMaster is the perfect tool for irrigation, abstraction, distribution and revenue metering.

AquaProbe: the flowmeter for probe-based in-situ flow measurement

Maximum performance with easy, low-cost installation. Whatever the location or installation requirements, AquaProbe provides a cost-effective insertion flowmeter solution. Both the FEA200 flow sensor and the transmitter are fully submersible, enabling installation in flooded chambers..

The solution

AquaProbe is an insertion type electromagnetic flowmeter; used as a permanent flow measurement solution or a portable survey tool. Assisting in the building of an accurate network model, locating leaks to check the operation of installed, full-bore meters. The sensor can be installed in pipelines without the need for major excavations or alterations to pipework.

General specifications			
Product	**WaterMaster**	**AquaMaster**	**AquaProbe**
Application	Water, waste water and sludge	Clean water	Clean water
Meter body style	Flanged	Flanged	1 in. BSP/1 in. NPT
Line sizes	10 to 2,400 mm (3/8 to 96 in.)	15 to 600 mm (1/2 to 24 in.)	200 to 8,000 mm (8 to 320 in.) nominal bore
Flow ranges	0 to 200,000 m^3/h	0 to 7,875 m^3/h	0 to 5 m/s (insertion size dependent)
Typical pressure loss	< 0 bar	< 0.63 bar	< 0.63 bar
Operating pressure	Nominal 16 bar	Nominal 16 bar	Nominal 16 bar, max. 20 bar
Accuracy	0.4% of rate standard or 0.2% optional	0.5% battery or 0.25% mains	± 2% of rate or ± 2 mm/s (± 0.08 in./s) whichever is the greater
Transmitter output	4 to 20 mA or 4 to 12/20 mA, galvanically isolated	Pulse output – 50 Hz maximum, 50% nominal duty cycle	Pulse output – 50 Hz maximum, 50% nominal duty cycle
Transmitter mounting	Remote/integral	Remote/integral	Remote
Agency approvals	OIML/MID/FM/ATEX/FMc/IECEX	OIML/MID	Drinking water (WRAS) approved
Digital communications	Profibus/HART/Modbus	SMS/GPRS	SMS/GPRS/Profibus/HART/Modbus
Power supply	Mains 85 to 265 V AC @ < 7 VA, DC 24 V ± 30% @ < 0.4 A	Battery/renewable/mains	Battery/renewable/mains
Wetted material	–	–	PEEK/stainless steel
Liner material	Elastomer/polypropylene/ PTFE (size dependent)	Elastomer	PEEK
Electrode material	Stainless steel/Hastelloy C	Stainless steel	Stainless steel

Coriolis mass flow measurement

From accurate dosing of single drops to filling ocean-going tanker

CoriolisMaster flowmeters offer high precision and lowest pressure drop

They help you save on installation costs due to a compact design, and save on lifetime costs due to minimum pressure drop, no moving parts and no wear-out of wetted parts in most applications. Measure flow rate (mass and volume), density, temperature and concentration in one meter.

The solution
The FCB400 is a general purpose mass flow meter for all industries, ideal for high precision filling and for process or well monitoring under tough conditions. Its wide variety of connections and software options allow flexibility for various applications. The FCB100 version is made for system integration, offering full access Modbus communication and fast pulse/frequency outputs.

CoriolisMaster Hygienic flowmeter: mass flow measurement for hygienic applications

The CoriolisMaster Hygienic is a general purpose meter for hygienic applications where polished wetted materials are required: from high precision filling to process monitoring under tough conditions. Its certified cleanability enables safe use in all hygienic flow measurement applications.

The solution
The CoriolisMaster FCH400 is one of the most cost saving meters on the market with minimal installation space requirements and lifetime costs. Plus it is suitable for hygienic applications. The CoriolisMaster FCH100 series is ideal for system integration with a simple to use transmitter interface.

Coriolis mass flow measurement

From accurate dosing of single drops to filling ocean-going tankers

Coriolis FCM2000: your flowmeter for many industries and applications

The Coriolis FCM2000 MS2 meter series features a bent single tube meter, designed for very low flow rates. It can measure single drops of liquid with high precision. The Coriolis FCM2000 MC2 meter's unique S-shape tube and modular design makes it the ideal instrument for tough measurement requirements.

The solution
The MS2 series is a low flow meter for all industries and various applications. It is easy to install and offers unrivalled measurement performance. The MC2 series is a general purpose meter delivering excellent results under tough conditions such as fast changing fluids, proven in thousands of applications worldwide.

General specifications sensors			
Product	**FCBxxx**	**FCHxxx**	**FCM2000 MS2**
Application	O&G, chemicals, marine, P&P, power, …	F&B and pharma	All industries
Sensor design	Bent twin tube sensor	Bent twin tube sensor	bent single tube meter
Meter sizes	15 to 150 mm (1/2 in. to 6 in.)	25 to 80 mm (1 in. to 3 in.)	1.5 to 6 mm (1/16 in. to 1/4 in.)
Flow ranges	0 to 860 t/h	0 to 250 t/h	0 to 1 t/h
Accuracy flow	FCBx30: 0.25% of measure value FCBx50: 0.1% of measured value	FCHx30: 0.25% of measure value FCHx50: 0.1% or measured value	0.15% or measured value
Accuracy density	FCBx30: 0.01 kg/m³ FCBx50: up to 0.0005 kg/m³	FCx30: 0.01 kg/m³ FCx50: up to 0.0005 kg/m³	0.01 kg/m³
Wetted material	Stainless steel or Ni-Alloy	Stainless steel or Ni-Alloy	Stainless steel or Ni-Alloy

General specifications electronics			
Product	**FCx400**	**FCx100**	**FCx300 and FCM2000 ME2**
Transmitter output	Up to 5 modular I/O, freely selectable and adjustable, HART	MODBUS RS485, 2 digital outputs (pulse, frequency, contact)	2 x mA, 1 pulse, 1 digital out, 1 digital in HART, Profibus PA, FF
Display	Through the glass operation	No	Through the glass operation
Power supply	110 to 240 VAC or 11 to 30 VDC	11 to 30 VDC	110 to 240 VAC or 24 VAC
Special features	Diagnostics, verification (VeriMass) DensiMass concentration measurement FillMass batch software	Diagnostics, verification (VeriMass) DensiMass concentration measurement FillMass batch software	Diagnostics DensiMass concentration measurement

Differential pressure flowmeters
Simplifying complex measurements

Torbar averaging pitot tubes: the multiport self-averaging flow meter

Torbars are suitable for flow measurement of gases, liquids and steam. Some of the many typical applications include water, natural gas, flue gas, nitrogen, combustion gases, ventilation air, sea water, cooling water, crude oil, saturated and superheated steam.

The solution
The Torbar design is based on the classical pitot tube concept of fluid flow measurement.
Since its design and launch, thousands of Torbar flowmeters have been installed. The withdrawable versions can be easily retracted from the pipeline even under flowing pressure.

Venturi tubes: for low pressure loss and high accuracy

Metering liquids, gases and steam in oil and gas, chemical, power and general industry, venturi tubes offer significantly lower permanent pressure losses leading to reduced pumping/compression costs.

The solution
The Venturi tube is a robust device, designed for use where low pressure-loss is required.
- Reduce energy costs by typically 20 to 25%
- Reduce greenhouse gas emissions
- Can be designed for elevated pressures and/or temperatures
- Full data dossiers available covering manufacture, materials and testing
- Flow calibration available for enhanced performance

Differential pressure flowmeters
Simplifying complex measurements

StackFlowMaster: for stack emission control

StackFlowMaster offers stack gas flow metering solutions that, when combined with a CEMS analyzer, form a complete CEMS package for the measurement of the mass flowrate of pollutants into the environment. It is based on the Torbar multi-port self-averaging pitot flow meter and offers ultra-low pressure loss coupled with options of auto zero / span and purging.

The solution

- New stack gas installations
- Add flow measurement to existing stack gas installations that lack flow metering, either to meet the legislation or for process information.
- Maintenance/repair/overhaul of existing stack gas installations, replacing the old flow meters to bring the installation up to the standards required by current legislation.

General specifications	
Product	**StackFlowMaster**
Application	Combustion exhaust gas metering in circular or rectangular stacks
Mounting	Full- or partial-insertion across stack via flanged branches
Stack diameters	1 to 8 meters (1.1 to 26.25 ft)
Typical pressure loss	< 0.1 bar
Operating pressure	As mounting flange rating (but typically these are low pressure systems)
Operating temperature	Maximum 1200 °C (2192 °F) depending on probe material
Typical accuracy	± 2% typically
Probe types	25 or 60 mm (1 or 2.36 in.) diameter probes, optionally with end supports
Probe material	316L and 321H stainless steel or UNS N06625 alloy
Mounting	Insertion via flanged branch with optional end support
Variants	Probe and tx only, optionally with MCERTS interface, meter purging or automatic zero/span checking
Transmitter output	4 to 20 mA
Transmitter mounting	Remote, direct on probe or within enclosure
Agency approvals	MCERTS/TUV to EN 14181 and EN 15267-3
Digital communications	HART or Modbus

Electromagnetic flow measurement
For the water industry

SwirlMaster: the flowmeter with a twist – uniquely available at ABB

The SwirlMaster FSS430/450 combines excellent measuring performance and enhanced flow calculation capability with flexibility in installation, due to low required inlet and outlet sections. Save 75% straight pipe run by employing SwirlMaster instead of traditional vortex meters, turbines or orifice plates.

The solution
SwirlMaster is used in almost every industry. In particular in chemical or petrochemical, oil and gas applications or power generation, especially in steam applications and energy measurement. SwirlMaster helps to reduce measurement uncertainty by 50% or more and offers significantly lower pressure loss compared to vortex meters with reduced bore.

VortexMaster: accurate measurement of non-conductive fluids

It features an integrated flow computer, excellent measuring performance and enhanced flow calculation capability.
The VortexMaster FSV430/450 provides accurate and reliable flow measurement data and is able to compensate for vibrations as well as pressure and temperature effects.

The solution
Whether chemical or petrochemical, oil and gas industry or power generation, vortex flowmeters are used in almost every industry. The integral flow computer function allows direct mass and energy measurement with one device especially for steam applications and energy measurement.

Thermal mass flow measurement
Dynamic mass measurement of gases

Sensyflow FMT400-VTS/FMT500-IG: intelligent and versatile

Sensyflow direct gas mass flowmeters operate within the widest flowrange. Highly accurate, even at low pressure and/or low flow rates, they improve process quality and provide easy installation and commissioning, low maintenance costs and short response times.

The solution
Direct gas mass flowmetering solutions succeed in a variety of industries and are essential at key stages across the process industry, where direct mass flow measurement combined with high accuracy, short response times, reliability and easy installation is required. Sensyflow saves you up to 30% set up time and 10% in gas consumption.

Sensyflow FMT200-ECO2: compact, dynamic and universal

The flowmeter is used for pneumatics, paint robot control, compressed air systems, gas dosing and burner control. It features compact and arbitrary mounting. Its highly modular process connections allow a universal machine integration and test set up.

The solution
The Sensyflow FMT200-ECO2 is a compact, dynamic and universal meter. It is easy to integrate in OEM solutions or other stationary dosing equipment. The fast response time of less than 25 milliseconds, its low weight and a great variety of process adapters allow for flexible integration. User-friendly system integration into customer-specific machines and the individual control loops are very easy to realize.

Multiphase flowmeters
The radioactive-free solution

VIS Multiphase flowmeter: for produced oil, gas and water

ABB VIS (VEGA Isokinetic Sampling) multiphase flowmeter is the ideal solution for flowmetering in upstream applications close to the wellhead. Based on a unique and patented technology, VIS provides the same accuracy of conventional test separators with no time delay and a much lower investment cost in a product sized radioactive-free device.

The solution

- Unique and patented technology
- Based on conventional instrumentation only (easy to commission and maintain)
- Radioactive-free, no gamma source involved
- Portable solution in a skid-mounted configuration for well-testing applications
- Tailored for gas storage applications
- Customizable according to specific requirements in terms of size, material and rating

General specifications	
Product	**VIS Multiphase**
Operating envelope	80-100% gas volume fraction
Accuracy for liquid flow rate	± 3% of reading
Accuracy for gas flow rate	± 3% of reading
Accuracy for water flow rate	± 5% of reading
Gas turndown	6:1 standard, 30:1 and 100:1 with special engineered solutions
Liquid turndown	Unlimited
Process connections	ANSI, API, UNI or according to project specifications
Nominal diameter	DN 50 (2 in.) to DN 300 (12 in.), larger sizes available on customer request
Material	Carbon steel, duplex steel or according to customer specification or process requirements
Design pressure	100 bar (1450 psi) and 230 bar (3300 psi) in standard configurations, Special configurations available according to process requirements
Process temperature	-40 °C (- 40 °F) to 300 °C (572 °F)
Ex approvals	ATEX CE Ex II 1 G Ex, US Class1 division1&2, IEC zones 1&2 Exd, other approvals can be provided on request
Communication	Analog (4 to 20 mA), Modbus (Ethernet or serial), other standards available on request
Pressure drop	0.3 to 1 bar
Size and weight	Footprint 0.5 x 0.8 mt, height 1.2 mt, 390 kg (for 4 in. ANSI 1500)
Flow direction	Vertical downward
Output signals	Gas, liquid and water flowrates, liquid and water density, pressure and temperature

Variable area flow measurement
Low cost measurement for gases, liquids and steam

PurgeMaster: for optimum flexibility with a minimum number of components

PurgeMaster A6100 flowmeters are low capacity variable area flowmeters for both liquid and gas with an excellent selection of material and scale lengths in a single product family design. They feature a corrosion resistant, high strength stainless steel body, quick, easy snap-in tube construction and a safety tested operator protection shield.

The solution
PurgeMasters are ideal for applications such as the purgingof control lines and instrument enclosures. Their use is easily extended into fluid sampling, liquid specific gravity, level measurement and similar services.

FGM1190: for a high degree of reproducibility

The wide variety of float weights and meter tubes allows the glass tube flowmeter FGM1190 to be matched exactly to the required flow range. The three ribs, parallel to the center axis of the meter tube, guide the float over the entire flow range. This enables a high degree of reproducibility because the float is absolutely centered in the meter tube.

The solution
Designed for flowrate measurements in many industries including system manufacture, food, water treatment plants and chemical. Aggressive fluid applications are possible because the fluid wetted parts can be made from a wide variety of different materials.

10A2235 RatoSight: stable and reliable

The RatoSight is a rugged, low cost glass tube meter providing stable and reliable operation. Its materials selection and outstanding installation flexibility make it the solution for visual indication of moderate viscosity liquids. It can be suited with fully adjustable, vibration-proof magnetic switches and relays.

The solution
Suitable for automatic shutdown of heavy equipment with forced lubrication control, extremely resilient on marine uses, desalination RO systems and high corrosion exposure environments.

General specifications			
Product	**PurgeMaster A6100**	**FGM1190**	**10A2235**
Application	Clean, low viscosity liquids and gases	Clean, low viscosity liquids and gases	Clean liquids and gases
Mounting	Vertically, in line, wall/surface or back of panel	Vertically, in line	Vertically, in line
Connections	¼ in. NPT or BSPP female, vertical or horizontal	¼ to 2 in. threaded, DN10 to DN50 flanged, SC15 to SC50 hygienic (DIN11851), vertical	½ to 2 in. threaded NPTI – horizontal/vertical
Seals	Buna N, Viton® ,EPR, Kalrez™	BUNA N, Viton®, EPDM	BUNA N, Viton®
Flow range	Full scale water flows from 0.53 to 2200 cm^3/min	Water flows from 0.002 to 17600 l/h	Water flows: up to 50 gpm Air: up to 110 SCFM
Flow turndown	Typically 10:1	Typically 10:1	Typically 10:1
Operating pressure	Up to 18 bar (261 lbf/in 2 g)	Up to 18 bar (261 lbf/in 2 g)	Up to 12 bar-g (175 PSIG or lbf/in 2 g)
Operating temperature	Up to 120 °C (248 °F)	Up to 180 °C (356 °F)	Up to 121 °C (250 °F)
Nominal scale lengths	38, 76, 125 or 250 mm (1½, 3, 5 & 10 in.)	100, 130 or 250 mm (4, 5 and 10 in.)	–
Accuracy	Class 1.6 to class 10, depending on tube diameter and scale length	Class 1.6 to Class 6, depending on tube diameter and float type	Standard 2-10% Calibrated 3-5%, size dependent
Flow control: - Alarms **- Regulation**	Proximity sensors, up to 2 off SS needle valve option, brass or SS flow regulator option	Inert gas switches, up to 2 off –	Reed Switch – min/max/both –
Tube/end con. materials	Glass/brass, 316SST or KYNAR™	Stainless steel, PVC or PVDF	Glass/brass
Float materials	Glass, Sapphire, Carboloy, Tantalum and Stainless steel	St. steel, Glass, Sapphire, Carboloy, PVC, Tantalum, HastelloyTM, Aluminium, PTFE	Brass: Liquids, Aluminum: Gases
Chassis	Stainless steel	Stainless steel	Bronze

Variable area flow measurement

Low cost measurement for gases, liquids and steam

10A4500: the one for all solution

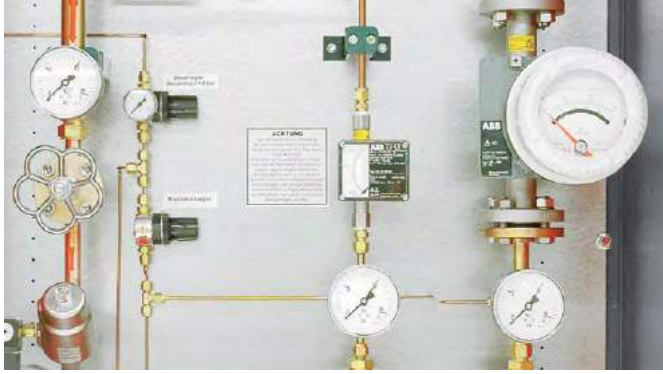
The 10A4500 is one of the highest quality and versatile variable area flowmeters on the market and is proven over a long history. Fully retrofitable with several float and tube designs for practically any clean liquid or gas process. Its wide view angle visibility, highly stable stainless steel frame and alarming capabilities make the 10A4500 the one for all solution.

The solution
The 10A4500 is suitable for gas and liquid applications. Beneficial for processes with low to no pipe run availability and low pressure loss limitations. It is particularly useful for aggressive and corrosive liquid measurement with the use of PTFE float and PVC fitting options.

FAM3200: for small gas and liquid flows

FAM3200 is an armored purgemeter designed to meter small gas and liquid flows. This meter is especially suited for applications with cloudy, opaque or aggressive fluids in chemical and pharmaceutical industries, gas analyzers, process systems, well systems and wherever glass metering tubes cannot be used for safety reasons

The solution
- Water purification
- Gas sampling systems, nitrogen generators
- Burner control
- Chemical injection
- Food and beverage applications



VA Master FAM540: first choice for oil rigs and chemical plants

Provided with a digital display, the all-metal variable area flowmeter is ideal for tough industrial flow measurement of liquids, steam and gases. It is resistant against salt spray and other external influences, reliable and precise.

The solution

Proven in many applications even under hardest conditions FAM540 flowmeter is suited where high pressure and/or high temperature operating conditions exist.

- Deionization, water purification, waste water treatment
- Gas sampling systems, nitrogen generators
- Power utility applications, cooling water, burner control
- Corrosive liquids, chemical injection
- Food and beverage applications

General specifications			
Product	**10A4500**	**FAM3200**	**VA Master FAM540**
Application	Clean, low viscosity liquids and gases	Clean, low viscosity liquids and gases	Clean liquids, gases and steam
Mounting	Vertically, in line	Vertically, in line or wall-mounted	Vertically, in line
Connections	½ to 2 in. threaded NPT/flanged CL150 – horizontal/vertical	¼ in. to 1 in. threaded, vertical or horizontal	½ in. to 4 in., flanged, hygienic (DIN, SMS), vertical
Flow ranges	Water flows: 0.2 to 90 GPM Air: 1 to 160 SCFM	Water flows: 1 to 3000 l/h	Water flows: 0.028 to 120 m^3/h
Flow turndown	Typically 10:1	Typically 10:1	Typically 10:1
Operating pressure	Up to 18 bar (261 lbf/in 2 g)	Up to 100 bar (1450 lbf/in 2 g)	Up to 100 bar (1450 lbf/in 2 g)
Operating temperature	Up to 121 °C (250 °F)	Up to 180 °C (356 °F)	Up to 400 °C (752 °F)
Nominal scale lengths	Standard: 250 mm (10 in)	–	–
Accuracy	Standard: 2%, Calibrated: 1 % full scale	Class 6	Class 1.6 (Class 2.5: PTFE lined tube opt.)
Repeatability	0.5% full scale	–	–
Flow control: - Alarms - Regulation	Inert gas switches, up to 2 off –	Slot sensors, up to 2 off SS needle valve option, brass or SS flow regulator option	Slot sensors, up to 2 off –
Alarm amplifier power	24 DC, 110 V AC, 230 V AC	24 V DC, 110 V AC, 230 V AC	24 V DC, 110 V AC, 230 V AC
Transmitter option	–	4 to 20 mA, 2-wire	4 to 20 mA, 2-wire
Tube/end con. materials	Stainless steel, PVC	–	–
Tube material	Borisilicate glass	Stainless steel	Stainless steel, optional PTFE lined
Float material	Stainless steel, HastelloyTM, PVC, PTFE	Stainless steel	St. steel, opt. PTFE lined/float damping
Chassis	Stainless steel	–	–

Flow computers
Spirit IT Flow-X Series

Flow-X flow computers offer the most advanced measurement technology, combined with powerful and flexible computation and communication capabilities.

Flow-X calculates and controls liquid and gas flows, according to the highest measurement standards. The core element is the Flow-X module that can be combined in various enclosures for single or multi-stream solutions. Each module offers real-time digital and analog signal processing, and advanced control features, such as: Proving, sampling, batching, valve control and PID logic.

The solution

- Flexible, compact and modular design to suit any gas or liquid application
- Compatible with most flow meters, transmitters and other field equipment
- Speed and power: Modern hardware to ensure the highest accuracy (0.002% at 20 °C) and to enable advanced software features
- High level of security and traceability: personal user-login with historical log of user activity
- User-friendly touch-screen
- Remote access through web server interface

General specifications per Flow-X/M module			
Input	Analog inputs	6	Total number of analog inputs + HART inputs = 6
	4-wire PRT inputs	2	
	HART loop inputs	4	
	Pulse inputs (Single/Dual)	1	Total number of digital inputs + digital outputs + pulse outputs + density inputs + sphere detector inputs = 16
	Density inputs (100 µs - 5000 µs)	4	
	Digital inputs	16	
	Sphere detector inputs	4	
Output	Digital outputs	16	
	Pulse outputs (max. 10 Hz)	4	
	Analog outputs (4 to 20 mA)	4	
	Prover bus outputs	2	
	Frequency outputs (max 10 kHz)	4	
Interfaces	RS485/RS232	2	
	RJ45	2	
Power supply	20 to 32 V DC, normal 24 V DC		
Processors	32-bit microprocessor with math coprocessor and FPGA		
Memory	1 GB on-board memory for time-stamped data, report archive and audit trail		

General specifications per Flow-X enclosure				
Flow-X/R	max. 8 Flow-X/M modules	approx. max. 14 kg	354.8 x 482 x 135 mm (h x w x d)	13.9 x 18.98 x 5.31 inch (h x w x d)
Flow-X/P	max. 4 Flow-X/M modules	approx. max. 7kg	237.5 x 139 x 294 mm	9.3 x 5.5 x 11.6 inch
Flow-X/C	1 Flow-X/M module	approx. max. 3kg	237.5 x 139 x 145 mm	9.3 x 5.5 x 5.7 inch
Flow-X/S	1 Flow-X/M module	approx. max. 2.5kg	250 x 142 x 164.1 mm	9.8 x 5.6 x 6.46 inch

Flow computers
Spirit IT eXLerate supervisory software

eXLerate is a software platform developed specifically for flow metering supervisory systems within the oil and gas industry. With eXLerate we make flow measurement systems better, smarter and more accurate.

eXLerate provides an automation solution for many oil and gas applications: Local or corporate flow measurement systems, crude gathering, meter calibration facilities, truck or ship loading and tank terminal automation. eXLerate offers comprehensive HMI tools to control and manage measurement data. In the critical process of oil and gas custody transfer, reliability is essential. eXLerate offers fully synchronized and integrated redundancy, guaranteeing a consistent environment.

The solution

- Accurate and flexible communication with field equipment
- Searchable measurement and audit historical data
- Sophisticated and flexible oil and gas production reports
- Extensive set of flow and fluid property calculations
- Embedded Virtual Flow Computing (VFC) functionality
- Integrated instrument validation & calibration functionality

Flow computers
Totalflow

Flow computers and RTUs for accurate and reliable flow measurement and automation of natural gas.

All ABB flow computers and RTUs comply with API, AGA, and ISO standards for custody-transfer electronic measurement devices and for flow rate, volume and energy calculations. In addition, all calculations are performed once per second and historical flow volumes and data logs can be stored for more than 40 days.

The solution

- Automate and control right from the office
- Measure in compliance with AGA/API standards
- Cost savings and increased revenues
- Multi-tube capabilities for control of large sites
- Explosion-proof, cast aluminum models available

General specifications						
Flow computers	Enclosure type/size	Approximate weight (without battery)	Maximum input/output modules	**Maximum battery capacity**	**Supports automation applications**	Integrated multivariable transducer
Differential flow computers						
XFC^{G4} 6410	Small enclosure	13.5 lbs	0	26AH	●	●
XFC^{G4} 6413	Medium enclosure	15 lbs	3	26AH	●	●
XFC^{G4} 6713	Large enclosure	29 lbs	6	52AH	●	●
µFLO^{G4} 6213	Medium enclosure	15.1 lbs	4-Point I/O opt. expansion card	26AH		●
XFC^{G4} 6200	EX explosion-proof enclosure	16.5 lbs	12-Point I/O opt. expansion card	Internal battery not supported	●	●
Linear flow computers						
XFC^{G4} 6411	Small enclosure	11.5 lbs	0	26AH	●	●
XFC^{G4} 6414	Medium enclosure	12 lbs	3	26AH	●	●
XFC^{G4} 6714	Large enclosure	27 lbs	6	52AH	●	●
µFLO^{G4} 6213	Medium enclosure	15.1 lbs	4-Point I/O Opt. expansion Card	26AH		●
XFC^{G4} 6201	EX explosion-proof enclosure	16.5 lbs	12-Point I/O Opt. expansion card	Internal battery not supported	●	●
RTUs						
XRC^{G4} 6490	Small enclosure	15 lbs	3	26AH	●	
XRC^{G4} 6790	Medium enclosure	29 lbs	6	52AH	●	
XRC^{G4} 6890	Large enclosure	45 lbs	14	140AH	●	
XRC^{G4} 6895*	X-Large enclosure	60 lbs	22	Internal battery not supported	●	
XRC^{G4} 6990	Panel mount	12 lbs	6 per board (max. 2 boards)	26/30AH	●	

*XRC^{G4} 6895 also has 20 fused power terminals (DIN rail mounted) and 259 mini terminal connections (mini DIN rail mounted).

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